8

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-200690
(43)Date of publication of application : 31.07.1997

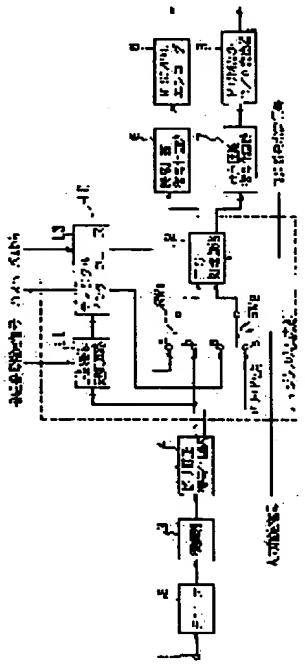
(51)Int.Cl. H04N 5/92
H04N 5/765

(21)Application number : 08-004119
(22)Date of filing : 12.01.1996

(71)Applicant : TOSHIBA CORP
(72)Inventor : HIROTA ATSUSHI
SAKAMOTO NORIYA
YAMADA MASAHIRO

## (54) DIGITAL BROADCASTING RECEPTION TERMINAL EQUIPMENT

(57)Abstract:
PROBLEM TO BE SOLVED: To record large capacity of signals without degrading quality and to enable the viewing of digital broadcasting.
SOLUTION: The output of an error correction decodijxg circuit 4 is applied through switches SW1 and SW2 to a TS(transport stream) processing circuit 12 and applied to a recording program selecting circuit 11 as well. The recording program selecting circuit 11 applies the encoded data of a desired program to a digital interface 13 and the digital interface 13 inputs/outputs the encoded data through a bus in the specification of P1394, for example. Thus, the encoded data can be applied to external equipment and recorded as they are and the degradation of quality can be prevented. The switches SW1 and SW2 switch the received signal with the output of the digital interface 13 and apply it to the TS processing circuit 12. The TS processing circuit 12 depackets the inputted encoded data. Thus, viewing is enabled based on the received signal or the output of external equipment.



LEGAL STATUS

[Date of request for examination] 11.04.2000

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's

decision of rejection]
[Date of extinction of right]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

---

CLAIMS

---

[Claim(s)]
[Claim 1] By changing a signal aspect between the digital broadcast signal to which it restored, and a predetermined digital signal While the digital broadcast signal by which the recovery was carried out [ aforementioned ] is changed and outputted to the aforementioned predetermined digital signal and the digital signal of the same signal aspect The digital interface means which can change and output the aforementioned predetermined digital signal to the digital broadcast signal by which the recovery was carried out [ aforementioned ], and the signal of the same signal aspect, The output of the digital broadcast signal to which it restored, or the aforementioned digital interface means is inputted. A transport processing means to output the configuration data of this selected program by choosing and carrying out demultiplexing of the predetermined program out of this inputted signal, Digital broadcast accepting-station equipment characterized by providing a decryption means to decrypt the output of this transport processing means.
[Claim 2] The aforementioned digital interface means is digital broadcast accepting-station equipment according to claim 1 characterized by providing a means to obtain the configuration data of the program which chose and carried out demultiplexing of the predetermined program, and chose it out of the digital broadcast signal to which it restored, and to change and output this configuration data to the aforementioned predetermined digital signal and the digital signal of the same signal aspect.
[Claim 3] While the digital broadcast signal to which it restored is inputted, and the configuration data of the program which chose and carried out demultiplexing of the predetermined program, and chose it out of this digital broadcast signal are changed into the aforementioned predetermined signal aspect and outputting as an external output It is possible to change and output the digital signal of the same signal aspect as the aforementioned external output to the digital broadcast signal by which the recovery was carried out [ aforementioned ], and the signal of the same signal aspect. Whether the output for regeneration is obtained from the configuration data of the program which chose and carried out demultiplexing of the predetermined program, and chose it out of the digital broadcast signal by which the recovery was carried out [ aforementioned ] Or a transport processing means to obtain the output for regeneration from the signal changed into the digital broadcast signal by which the recovery was carried out [ aforementioned ], and the signal of the same signal aspect, Digital broadcast accepting-station equipment characterized by providing a compression decryption means to decrypt the aforementioned output for regeneration from this transport processing means.
[Claim 4] The aforementioned transport processing means is digital broadcast accepting-station equipment according to claim 3 characterized by providing the 1st program specification means which chooses the program of the aforementioned external output.
[Claim 5] The aforementioned transport processing means is digital broadcast accepting-station equipment according to claim 3 characterized by providing the 2nd program specification means which chooses the program of the 1st program specification means which chooses the program of the aforementioned external output, and the aforementioned output for regeneration.

---

[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

---

Field

---

[0001] [The technical field to which invention belongs] this invention relates to the digital broadcast accepting-station equipment which receives a digital broadcast of a multichannel.

---

[Translation done.]

* NOTICES *



---

Technique

---

[0002] [Description of the Prior Art] In recent years, digitization of a picture image is progressing and digitization is considered by the establishment of bandwidth compression techniques, such as MPEG (Moving Picture Experts Group)2, also in television broadcasting. In the digital broadcast, it is expected by using bandwidth compression technique, digital strange recovery technique, etc. that the signal of various service arrangements, such as a picture, voice, and various data, can be multiplexed.
[0003] In MPEG 2, two kinds of multiple-signal formats, PS (Program Stream) and TS (Transport Stream), are specified. Especially TS system has the function to multiplex and transmit two or more programs, and corresponds to multichannel-izing of a broadcast and a communication, or multimedia-ization in a store media while it corresponds to a transmission error.
[0004] In TS system, in order to make easy Time Division Multiplexing, such as two or more picture images, voice, and data, transmission data are transmitted per packet of a fixed length. The data of the same modality constitute one packet and it indicates in an HDR the identification information which is different for every modality of data in each packet. The receiver which receives and carries out decryption processing of such a digital broadcast signal is also called a set top box or IRD (Integrated Receiver Decoder).
[0005] Drawing 11 is a block diagram showing such IRD.
[0006] RF (RF) broadcast signal inputted through the input terminal 1 is given to a tuner 2. A tuner 2 chooses the signal of a predetermined transmission-frequency band from the inputted broadcast signal, and outputs it to a demodulator 3. After a demodulator 3 carries out A/D conversion of the signal of the tuned-in channel, the digital recovery of it is carried out. In addition, as strange recovery processing in a transmitting side and a receiving side, strange recovery methods, such as QAM or QPSK, are adopted, for example.
[0007] The signal to which it restored by the demodulator 3 is given to the error correction decryption circuit 4. The error correction decryption circuit 4 carries out error correction of the signal to which it restored using the error correcting code contained in the signal to which it restored. As an error correcting code, convolutional codes, such as the Viterbi sign, or RS (Lead Solomon) sign is used, for example. The output of the error correction decryption circuit 4 is supplied to TS processing circuit 5.
[0008] As mentioned above, in TS system, multiplex [ of two or more services (program) ] is carried out, and they are transmitted. TS processing circuit 5 chooses and carries out demultiplexing of the predetermined service from two or more services by which multiplex was carried out. For example, TS processing circuit 5 separates picture data from the inputted signal, is outputted to the picture compression decryption circuit 6, separates voice data, and outputs it to the speech-compression decryption circuit 7.
[0009] The picture data and voice data from TS processing circuit 5 are compressed by for example, MPEG 2 specification. The picture compression decryption circuit 6 decrypts the picture data encoded, obtains digital brightness data Y and the digital color difference data Cb and Cr, and outputs them to NTSC / PAL encoder 8 as a component signal. Moreover, voice data is decrypted by the speech-compression decryption circuit 7, and is given to PCM and D/A converter 9.
[0010] By NTSC / PAL encoder 8, the decrypted picture data are changed and outputted to the composite video signal of an NTSC color TV system or a PAL system. Moreover, the decrypted voice data is changed and outputted to an analog sound signal by PCM and D/A converter 9.

[0011] By the way, it can consider recording the digital broadcast signal of such a multichannel with VTR (video tape recorder). In this case, how to use analog VTR which has generally spread, and the method of using digital VTR currently developed for business can be considered. When using analog VTR, the analog output from NTSC / PAL encoder 8, PCM, and D/A converter 9 of drawing 11 is made to supply and record on VTR. In this case, although there is an advantage that VTR which has generally spread can be used, conversion analogically has big influence on a quality from digital one, and there is a fault that a quality-of-image degradation is not avoided.
[0012] When using digital VTR currently developed for business, the digital component signal from a picture and the speech-compression decryption circuits 6 and 7 is made to give and record on digital VTR. However, generally the amount of information of the digital component signal which is not compressed is huge, and in order to enable prolonged record, it has the fault that the record medium of a very big capacity is required. Moreover, such a digital VTR also had the problem are very expensive.

---

[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

---

TECHNICAL PROBLEM

---

[0013] [Problem(s) to be Solved by the Invention] Thus, the cheap equipment which performs prolonged record had the trouble where it did not exist, without a digital broadcast signal degrading a quality conventionally.
[0014] this invention is made in view of such a trouble, and while prolonged record is enabled, without degrading the quality of a digital broadcast signal, it aims at offering the digital broadcast accepting-station equipment which can be constituted cheaply.

---

[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

---

MEANS

---

[0015] [Means for Solving the Problem] The digital broadcast accepting-station equipment concerning the claim 1 of this invention By changing a signal aspect between the digital broadcast signal to which it restored, and a predetermined digital signal While the digital broadcast signal by which the recovery was carried out [ aforementioned ] is changed and outputted to the aforementioned predetermined digital signal and the digital signal of the same signal aspect The digital interface means which can change and output the aforementioned predetermined digital signal to the digital broadcast signal by which the recovery was carried out [ aforementioned ], and the signal of the same signal aspect, The output of the digital broadcast signal to which it restored, or the aforementioned digital interface means is inputted. A transport processing means to output the configuration data of this selected program by choosing and carrying out demultiplexing of the predetermined program out of this inputted signal, The digital broadcast accepting-station equipment which possesses a decryption means to decrypt the output of this transport processing means, and relates to the claim 3 of this invention While the digital broadcast signal to which it restored is inputted, and the configuration data of the program which chose and carried out demultiplexing of the predetermined program, and chose it out of this digital broadcast signal are changed into the aforementioned predetermined signal aspect and outputting as an external output It is possible to change and output the digital signal of the same signal aspect as the aforementioned external output to the digital broadcast signal by which the recovery was carried out [ aforementioned ], and the signal of the same signal aspect. Whether the output for regeneration is obtained from the configuration data of the program which chose and carried out demultiplexing of the predetermined program, and chose it out of the digital broadcast signal by which the recovery was carried out [ aforementioned ] Or a transport processing means to obtain the output for regeneration from the signal changed into the digital broadcast signal by which the recovery was carried out [ aforementioned ], and the signal of the same signal aspect, A compression decryption means to decrypt the aforementioned output for regeneration from this transport processing means is provided.
[0016] In the claim 1 of this invention, the digital broadcast signal to which it restored by the digital interface means is changed into a predetermined signal aspect, and the output is possible for it to the external instrument. Moreover, a transport processing means chooses and carries out demultiplexing of the predetermined program from the output of a digital broadcast signal or a digital interface means. The coded data from a transport processing means is given to a decryption means, and is decrypted.
[0017] In the claim 3 of this invention, demultiplexing of the predetermined program is chosen and carried out by the transport processing means, and the digital broadcast signal to which it restored is outputted as an output for regeneration, while it is changed into a predetermined signal aspect and it is outputted as an external output. The coded data of the output for regeneration from a transport processing means is given to a decryption means, and is decrypted.
[0018]
[Embodiments of the Invention] Hereafter, with reference to a drawing, the gestalt of operation of this invention is explained in detail. Drawing 1 is a block diagram showing the gestalt of 1 implementation of the digital broadcast accepting-station equipment concerning this invention. In drawing 1 , the same sign is given to the same component as drawing 11 .
[0019] Bandwidth compression is carried out to an input terminal 1, for example, it is constituted by the stream based on TS multiplex system of MPEG 2 specification, and RF broadcast signal modulated by

modulation techniques, such as QAM or QPSK, is inputted. This RF broadcast signal is given to a tuner 2. A tuner 2 chooses the signal of a predetermined transmission-frequency band from the inputted broadcast signal, and outputs it to a demodulator 3.
[0020] A demodulator 3 restores to a broadcast signal by digital recovery processing according to the modulation technique of a transmitting side, after carrying out A/D conversion of the signal of the tuned-in channel. The signal to which it restored by the demodulator 3 is given to the error correction decryption circuit 4. The error correction decryption circuit 4 carries out error correction of the signal to which it restored using the error correcting code added to program data in the transmitting side. As an error correcting code, convolutional codes, such as the Viterbi sign, or RS (Lead Solomon) sign is used, for example. The output of the error correction decryption circuit 4 is the coded data by which program data were packet-ized. This coded data is supplied to the digital-input/output section 10.
[0021] The digital-input/output section 10 is constituted by a switch SW1, SW2, the record program selection circuitry 11, TS processing circuit 12, and the digital interface 13. The output is possible for the digital-input/output section 10 to the external instrument which does not illustrate the coded data from the error correction decryption circuit 4. The digital-input/output section 10 can process alternatively the coded data from the error correction decryption circuit 4, or the coded data from an external instrument, and can view and listen now to it.
[0022] That is, the coded data from the error correction decryption circuit 4 is a switch SW1. While terminal b is supplied, the record program selection circuitry 11 is also supplied. The record program selection circuitry 11 chooses the program based on a program number specification signal from two or more programs included in coded data, and outputs it to the digital interface 13. The digital interface 13 is outputted as an external output on the bus which does not change and illustrate the output of the record program selection circuitry 11 to a predetermined digital format. Moreover, the digital interface 13 is a switch SW1 and SW2, respectively about the coded data inputted through the bus not to illustrate, and its control signal. Terminal a is supplied.
[0023] Switch SW2 A ******** (valid) signal is also inputted into terminal b. A ******** signal is a control signal which shows significant part among the outputs of the error correction decryption circuit 4, and is supplied from the error correction decryption circuit 4. The drawing 2 and the drawing 3 are for explaining the significant part of coded data. Drawing 2 is explanatory drawing showing TS packet, and drawing 3 is a timing chart which shows a ******** signal.
[0024] The packet size of the TS packet 15 in TS system of MPEG 2 specification is 188 bytes of fixed length. As shown in drawing 2 , the error correcting code 16 of 16 byte length is added to this TS packet immediately before. The error correction decryption circuit 4 outputs only the TS packet 15 except an error correcting code 16 as coded data.
[0025] Drawing 3 (a) shows the coded data from the error correction decryption circuit 4. Moreover, drawing 3 (b) shows the ******** signal. Even if the packet of the broadcast signal into which the output of the error correction decryption circuit 4 was inputted since the error correcting code was removed is continuing, the opening for 16 bytes produces TS packets from the error correction decryption circuit 4. As shown in drawing 3 (b), the ******** signal shows the position where 188 bytes of effective packet data exist.
[0026] drawing 1 -- setting -- a switch SW1 -- SW2 It replaces, it has interlocked based on an input specification signal, in performing viewing and listening based on a broadcast input signal, it chooses terminal b, and in performing viewing and listening based on the regenerative signal from VTR, it chooses terminal a. a switch SW1 and SW2 **** -- a signal is supplied to TS processing circuit 12
[0027] As mentioned above, TS packet can correspond to the multi-program and can choose the packet of a desired program now out of two or more programs transmitted by time sharing at the time of a decryption. For this selection, before the pay load (Payload) which generally transmits an information required for coded data or demultiplexing, TS packet adds an HDR (Header) and is transmitted. 4 bytes in 188 bytes of TS packet are an HDR. In addition, PES (Packetized Elementary Stream) packet is constituted by some TS packets.
[0028] As for an HDR, a synchronous byte (sync_byte) is arranged at the head. Henceforth, the error indicator in which the existence of a bit error is shown (transport packed error indicator), The unit start identification which shows start of PES packet (PES packet start indicator), TS packet priority which shows the significance of a packet (transport priority), PID which is the identification information of a

packet (Packet identification), The scramble control which shows the existence of scramble (stransport scrambling control), The adaptation field control (adaptation field control) which shows an adaptation field, the existence of a pay load, etc., and the round counter (continuity counter) which shows the continuity of the same PID are arranged one by one, and is constituted. In addition, the 8-bit synchronous byte of the head of a packet is a specific code, and has always become the value of 47 in hexadecimals.

[0029] TS processing circuit 12 has the function to extract the packet of the same PID from the packet inputted one by one with reference to PID, and, thereby, can decrypt only a desired program from transmission data.

[0030] Moreover, PID of each packet can be arbitrarily set up under under a fixed management by the transmitting side, and needs to clarify correspondence with informations, such as a modality shown by PID and this PID at the time of sending. For this reason, in a transport stream, while the identification table (PMT) which describes the list of PID etc. is transmitted by predetermined TS packet (program map table (PMT) transmission packet), TS packet (program association-table (PAT) transmission packet) which shows PID of this PMT transmission packet is transmitted. PID of this PAT packet is set as 0. In addition, PAT and PMT transmission packet are transmitted for every predetermined spacing. TS processing circuit 12 recognizes the relation between PID and the modality of transmission data by referring to PMT. It **********-izes and TS processing circuit 12 is outputted while the program number specification signal according to user operation is given and it separates the program based on this program number specification signal.

[0031] Picture data are supplied to the picture compression decryption circuit 6 among the outputs of TS processing circuit 12, and voice data is supplied to the speech-compression decryption circuit 7. Bandwidth compression of the picture data and voice data from TS processing circuit 12 is carried out. The picture compression decryption circuit 6 decrypts the picture data encoded, makes a component signal digital brightness data Y and the digital color difference data Cb and Cr, and outputs them to NTSC / PAL encoder 8. Moreover, the speech-compression decryption circuit 7 decrypts the voice data from TS processing circuit 12, and outputs it to PCM and D/A converter 9.

[0032] NTSC / PAL encoder 8 changes and outputs the decrypted picture data to the composite video signal of an NTSC color TV system or a PAL system. Moreover, PCM and D/A converter 9 change the decrypted voice data into an analog sound signal, and output it.

[0033] In the gestalt of this operation, the serial interface of P1394 specification is adopted as a digital interface 13, for example. Drawing 4 is a block diagram showing the concrete configuration of the digital interface 13 in drawing 1 , and shows the fundamental configuration of P1394.

[0034] It has the eye ********** (isochronous) transfer (henceforth synchronous transmission) function to guarantee transmitting a picture, voice data, etc. within fixed time while the multiplex transfer of two or more channels is possible for P1394. Moreover, P1394 can adopt the topology of the shape of a daisy chain and a tree. Fast transmission of 400Mbpses (bit per second) is possible for P1394 at the maximum, and it attracts attention as a peripheral interface adapter of the low cost suitable for multimedia intended use.

[0035] In IEEE, the physical layer and the link layer are specified as a specification of P1394. By the physical layer, the coding method and electric specification of a serial signal are defined, and the notice into operation of the bus arbitration which arbitrates a bus royalty, and the whole bus about the traffic status etc. is specified. Moreover, the protocol of the low about read-out and writing of data is prescribed by the link layer.

[0036] The digital interface 13 has a configuration corresponding to the link layer and the physical layer like P1394, respectively. A link layer is constituted by the buffer section 21 and the transducer 22. The buffer section 21 is constituted by the transmission buffer which has the asynchronous transmission buffer 23 and the eye ********** transfer buffer 24. The buffer section 21 is connected to the data-processing section not to illustrate, and the cable port 33 of a physical layer is connected to the external instrument of other nodes through the bus not to illustrate (not shown).

[0037] At the time of sending, the transmit data from any of the asynchronous transmission buffer 23 or the eye ********** transfer buffer 24 or one side is supplied to the transmitter 25 of a transducer 22. A transmitter 25 packet-izes the inputted transmit data by predetermined format. The CRC circuit 27 generates 32-bit CRC (Cyc1ic Redundancy Check) sign for error detection to the HDR of a packet, and

the both sides of data. The physical interface 28 transmits the packet data with which CRC sign was added to a physical layer.
[0038] The link interface 31 gives the transfer data from the physical interface 28 to the transfer data encoder 32. The clock from the clock generation machine 35 is also given to the transfer data encoder 32. After the transfer data encoder 32 encodes the inputted transfer data, it is outputted to the cable port 33 with a strobe signal.
[0039] On the other hand, the encoding data and the strobe signal which were inputted through the cable port 33 of a physical layer at the time of reception are given to the receiving data decoder 34. The receiving data decoder 34 decodes encoding data, and supplies them to a receiver 30 through the link interface 31 and the physical interface 28. In addition, the receiving data decoder 34 reproduces a receive clock by encoding data and the strobe signal.
[0040] A receiver 30 detects whether the information which shows the response node contained in packet data from a demand node (********** node) is what shows the node of self. In being data to the node of self, it checks CRC sign of a packet by the CRC circuit 27. If the error has not occurred, a receiver 30 decides the packet data containing an HDR, and supplies a receive buffer 37. In addition, when the error has occurred, a receiver 30 ignores the remaining data while he discards an HDR. The data stored in the receive buffer 37 are supplied to the data-processing section not to illustrate.
[0041] Drawing 5 is explanatory drawing showing the transmission protocol procedure in a link layer.
[0042] In P1394, in between [ of each node ] devices, a signal is transmitted to both directions through a bus, and a parentage is determined. Any one of each of the device becomes a main phone, and others serve as a cordless handset. A main phone determines and notifies the identification number of each device. In addition, this operation is the same as that of what is performed in the interface of SCSI etc. As mentioned above, the data transmitted in a bus top have packet structure, and ID for distinguishing a transmitter machine is inserted in the HDR of a packet. Moreover, ID (dsetination ID) of the receiver for it being shown whether which device is made to receive transmit data is also inserted in a packet HDR.
[0043] An end of these bus reset actions performs a bus arbitration in advance of a data transfer. As shown in drawing 5 , a ********** node (requiring agency node) publishes the demand command of a bus royalty to the root node on a topology first. A root node permits a bus royalty to a ********** node. Next, a ********** node notifies any of 100,200,400Mbpses the transfer rates of a data packet are to a target node (demand place node), and, subsequently publishes a read-out command, for example. To this read-out command, a target node returns acknowledgement and data transfer is started. After data transfer is completed, a target node transmits status information, a ********** node returns acknowledgement and a series of procedure ends it.
[0044] Drawing 6 is explanatory drawing for explaining an eye ********** transfer, and shows the data to which the bus top is transmitted.
[0045] As mentioned above, in an eye ********** transfer, data are transmitted on a bus in a fixed cycle (eye ********** cycle). In addition, eye ********** cycles are the periods of 125 microseconds. A root node controls an eye ********** transfer by functioning as a cycle master. That is, a cycle master doubles each node with the time corresponding to the cycle time expressed by 32 bits first. A synchronization of each node is taken based on this cycle time. Next, a cycle master transmits packet CSW1 called cycle-start packet to 125 microseconds at 1 time of a rate, CSW2, and --, as shown in drawing 6 .
[0046] A ********** node will start an eye ********** data transfer, if a cycle-start packet is received. In addition, although it can be intermingled, an eye ********** transfer and asynchronous transmission do not perform asynchronous transmission until an eye ********** transfer is completed. 1 cycle of asynchronous transmission is specified to 63.5 or less microseconds so that an eye ********** transfer may be ensured.
[0047] drawing 6 -- the eye ********** cycles 1, 2, and 3 and -- setting -- cycle-start packet CSW1 -- CSW2 and -- are transmitted Eye ********** data are transmitted in between cycle-start packets. In drawing 6 , the audio data shown with the video data and left oblique line which are shown with the right oblique line are eye ********** data. That is, the video data of a channel 0 is transmitted immediately after a cycle-start packet, and the audio data of a channel 6 are transmitted immediately after a video data, for example. 1 set of these video datas and audio data is certainly transmitted between cycle-start packets.

[0048] If an eye ********** data transfer is completed, between idle states until a cycle-start packet is next transmitted, an Arbitration will be performed and asynchronous transmission will be started. In drawing 6 , **** shows the asynchronous transmission data transfer.
[0049] After completing asynchronous transmission, a cycle-start packet is transmitted. As it follows, for example, it is shown in drawing 6 , the transfer timing of a cycle-start packet may be late for the start point of a cycle 2. When this delay is large, the cycle (between a cycle 3 and 4) which does not perform an asynchronous transmission data transfer is generated, and an eye ********** transfer is guaranteed.
[0050] In drawing 4 , in performing an eye ********** transfer, a transmitter 25 packet-izes the data from the eye ********** transfer buffer 24 by predetermined format. The cycle timer 26 is outputting the data in which the cycle time corresponding to 1 cycle of eye ********** is shown, and a transmitter 25 transmits data in the cycle time.
[0051] On the other hand, a receiver 30 will transmit this information to a cycle timer 26 through the cycle monitor 29, if the cycle-start message in a cycle-start packet is received. A receiver 30 inserts in received data the cycle mark packet which shows an end of an eye ********** cycle, and stores in a receive buffer 37. In addition, the cycle monitor 29 is used only at the time of an eye ********** transfer, supervises a series of transceiver operation, and sets the flag of interruption of each status to a register 36.
[0052] Next, an operation of the gestalt of the operation constituted in this way is explained.
[0053] RF broadcast signal inputted through the input terminal 1 is supplied to a tuner 2, and the signal of a predetermined channel tunes it in. The tuned-in signal is given to a demodulator 3 and it restores to it by recovery processing corresponding to the modulation technique of a transmitting side. The output of a demodulator 3 is the transport stream of for example, MPEG 2 specification. The output of a demodulator 3 is supplied to the error correction decryption circuit 4, and the error correction decryption circuit 4 performs error correction using an error correcting code. In this way, from the error correction decryption circuit 4, TS packet from which the error correcting code was removed is supplied to the digital-input/output section 10.
[0054] Now, viewing and listening based on a broadcast input signal shall be performed. In this case, they are a switch SW1 and SW2 by the input specification signal. Terminal b is chosen. If it does so, the ******** signal which shows TS packet from the error correction decryption circuit 4 and the significant part of this TS packet will be supplied to TS processing circuit 12.
[0055] TS processing circuit 12 reads the significant part of TS packet based on a ******** signal, and extracts PMT transmission packet based on PAT and a program number specification signal. TS processing circuit 12 checks correspondence with PID and the modality of transmission data using the identification table transmitted by PMT transmission packet, and separates and **********-izes each packet for every modality. TS processing circuit 12 considers the separated picture data as the output for regeneration, is given to the picture compression decryption circuit 6, considers voice data as the output for regeneration, and gives it to the speech-compression decryption circuit 7.
[0056] Picture data and voice data are decrypted by the picture compression decryption circuit 6 and the speech-compression decryption circuit 7, respectively, and are supplied to NTSC / PAL encoder 8, PCM, and D/A converter 9. The decryption data of a picture are changed and outputted to a composite video signal by NTSC / PAL encoder 8. Moreover, audio decryption data are changed and outputted to an analog sound signal by PCM and D/A converter 9. By supplying the display which does not illustrate these composite video signals and an analog sound signal, it can view and listen to the program chosen of the input signals.
[0057] Next, received data shall be recorded with digital VTR connected on the bus not to illustrate. The packet data by which error correction was carried out from the error correction decryption circuit 4 are supplied also to the record program selection circuitry 11. With the program number specification signal based on an user, the record program selection circuitry 11 extracts only the packet which constitutes the program based on a program number specification signal from inputted packet data, and outputs it to the digital interface 13 as it is.
[0058] The digital interface of digital VTR not to illustrate precedes a data transfer, and performs a bus arbitration. If a bus royalty is permitted, digital VTR will publish the read-out command of data. The digital interface 13 will incorporate TS packet data from the record program selection circuitry 11, if this

read-out command is received.
[0059] TS packet data are inputted into a transmitter 25 through the eye ********** transfer buffer 24. An eye ********** transfer is performed about TS packet data from the eye ********** transfer buffer 24. That is, a transmitter 25 secures TS packet data transfer for every eye ********** cycle using the cycle time from a cycle timer 26. A transmitter 25 packet-izes TS packet data by predetermined format, and outputs them to the physical interface 28. The physical interface 28 supplies packet data to the transfer data encoder 32 through the link interface 31. Encoding processing of the packet data is carried out by the transfer data encoder 32, and they are delivered on the bus which is not illustrated through the cable port 33 by it. Digital VTR not to illustrate carries out packet conversion of the transmitted packet data according to a record format, and records them on a predetermined record medium.
[0060] Next, it shall reproduce, view and listen to TS packet data currently recorded on digital VTR. In this case, the switch SW1 of the digital-input/output section 10 and SW2 Terminal a is chosen. If the digital interface 13 performs a bus arbitration and a bus royalty is acquired, it will demand a data transfer from digital VTR. TS packet data from digital VTR are inputted into the cable port 33 of the digital interface 13 through a bus, and are decoded by the receiving data decoder 34.
[0061] Decoded TS packet data are supplied to a receiver 30 through the link interface 31 and the physical interface 28. It packet-izes and a receiver 30 stores settled packet data in a receive buffer 37 while he detects an error using the CRC circuit 27. The packet data stored in the receive buffer 37 are a switch SW1. Terminal a is supplied. In addition, switch SW2 The ******** signal which shows significant part is supplied to terminal a. A switch SW1 and SW2 Since terminal a is chosen, TS packet data ** ******** signal from the digital interface 13 is supplied to TS processing circuit 12.
[0062] Inputted TS packet is separated for every modality, and TS processing circuit 12 **********-izes, it gives the separated picture data to the picture compression decryption circuit 6, and gives voice data to the speech-compression decryption circuit 7. The future operation is the same as that of the time of processing of received data. In this way, viewing and listening based on the coded data currently recorded on digital VTR is possible.
[0063] Thus, in the gestalt of this operation, after **********-izing the output of the error correction decryption circuit 4, the compression coded data which outputted to the external instrument through the digital interface 13, for example, was formed into TS packet with record regenerative apparatus, such as digital VTR, is recordable. Since digital data is recorded, it can prevent that a signal deteriorates in connection with record. Moreover, since the coded data formed into TS packet is recorded, a required record capacity can be reduced in an external instrument.
[0064] Moreover, the coded data which was recorded on digital VTR and which was formed into TS packet is incorporated through the digital interface 13, TS processing circuit 12 is given, and viewing and listening based on the coded data from an external instrument is possible. Since TS inputted from the external instrument can be **********-ized and coded data can be decrypted, in an external instrument, it is not necessary to prepare coding and a decryption circuit, and a cheap external instrument can be used.
[0065] Furthermore, the switch SW1 for switching an input signal and the signal from an external instrument and SW2 Since it has prepared, the input port of TS processing circuit 12 can be carried out in common, and there is also an advantage that TS processing circuit which does not correspond to a digital input/output can be used as it is.
[0066] Moreover, since the record program selection circuitry 11 is formed and an information required for TS processing circuit 12 can be shared as compared with the case where a program extraction processing circuit is established in an external-instrument side, while a configuration can be simplified, the amount of data transfer to an external instrument is also reducible.
[0067] Drawing 7 is a block diagram showing the digital-input/output section included in the gestalt of other operations of this invention. The gestalt of operation of drawing 7 differs from the gestalt of operation of only the configuration of the digital-input/output section of drawing 1 . In drawing 7 , the same sign is given to the same component as drawing 1 , and an explanation is omitted. The gestalt of this operation is the example which enabled it to omit the record program selection circuitry 11 from the digital-input/output section by using the program optional feature in TS processing circuit.
[0068] In the gestalt of this operation, it differs from the gestalt of operation of drawing 1 in that

replaced with the digital-input/output section 10 and the digital-input/output section 41 was formed. The digital-input/output section 41 replaces with TS processing circuit 12 while the record program selection circuitry 11 is deleted, and TS processing circuit 44 is formed.
[0069] The packet data from the error correction decryption circuit 4 are inputted into an input terminal 42. Moreover, the ******** signal which shows the significant part of packet data is inputted into an input terminal 43.
[0070] TS processing circuit 44 recognizes the relation of PID of each stream and the modality of data which constitute a specification program by referring to the identification table of PMT transmission packet transmitted by the packet with PID corresponding to the specification program number which searches PAT and is obtained. And TS processing circuit 44 has the function to extract the packet of the same PID from the packet inputted one by one with reference to PID. In this way, TS processing circuit 44 is **********-ized and is outputted to a picture and the speech-compression decryption circuits 6 and 7 while a program number specification signal is given and it separates the program based on this program number specification signal. Furthermore, in the gestalt of this operation, TS processing circuit 44 extracts only the packet which constitutes a program based on a program number specification signal, and outputs it also to the digital interface 13.
[0071] Thus, in the gestalt of the constituted operation, TS packet corresponding to TS system of MPEG 2 specification is inputted through an input terminal 42, for example. TS packet data from an input terminal 42 and the packet data from the digital interface 13 are a switch SW1, respectively. Terminals b and a are given. Moreover, switch SW2 The digital interface 13 or the ******** signal from an input terminal 43 is given to terminals a and b, respectively.
[0072] Now, viewing and listening of the broadcast signal under reception shall be directed by user operation. In this case, a switch SW1 and SW2 Terminal b is chosen. If it does so, TS packet data and the ******** signal based on an input signal will be given to TS processing circuit 44. TS processing circuit 44 separates the packet corresponding to the program number specification signal based on user operation, and it **********-izes and it outputs it while the digital interface 13 is supplied.
[0073] The output of TS processing circuit 44 is supplied to a picture and the speech-compression decryption circuits 6 and 7. A picture and the speech-compression decryption circuits 6 and 7 decrypt the inputted coded data, and restore original picture data and original voice data. In this way, viewing and listening based on an input signal is possible.
[0074] On the other hand, the digital interface 13 performs predetermined transform processing to the inputted packet data, and outputs it to them through a bus. By giving digital VTR which does not illustrate the output of the digital interface 13, it can record as it is, without decrypting the coded data which received and which was formed into TS packet.
[0075] Other operations are the same as that of the gestalt of operation of drawing 1 .
[0076] Thus, also in the gestalt of this operation, the same effect as the gestalt of operation of drawing 1 can be acquired. Furthermore, in the gestalt of this operation, the record program selection circuitry 11 can be omitted and there is an advantage that a circuit scale can be reduced much more.
[0077] In addition, it sets in the gestalt of this operation and they are a switch SW1 and SW2. It is also possible to output other programs through the digital interface 13, and to record on external digital VTR etc., viewing and listening to the program under present broadcast by preparing the 2nd program number specification means in TS processing circuit 41, although the packet data based on an input signal or the packet data from the digital interface 13 is chosen and it is listening [ are and ] made to view.
[0078] Drawing 8 is a block diagram showing the digital-input/output section included in the gestalt of other operations of this invention. The gestalt of operation of drawing 8 differs from the gestalt of operation of only the configuration of the digital-input/output section 51 of drawing 1 . The gestalt of this operation is the example which omits a switch s1, s2, the record program selection circuitry 11, and the digital interface 13, and was made to realize these circuit functions in TS processing circuit 52.
[0079] TS processing circuit 52 chooses and **********-izes the packet of a predetermined modality from the packet data inputted with the program number specification signal based on user operation. TS processing circuit 52 outputs the **********-ized coded data to a picture and the speech-compression decryption circuits 6 and 7. Furthermore, TS processing circuit 52 can be outputted now through the bus which changes TS packet data into the packet data corresponding to P1394, and does not illustrate them. Moreover, conversely, TS processing circuit 52 changes into TS packet data the

packet data inputted through the bus, and after it **********-izes, it can also output them to a picture and the speech-compression decryption circuits 6 and 7. With the input specification signal based on user operation, TS processing circuit 52 can choose the packet data of an input signal, or can choose now the packet data from an external instrument.
[0080] Next, drawing 9 carries out flow chart reference, and an operation of the gestalt of the operation constituted in this way is explained. Drawing 9 shows the processing flow of TS processing circuit 52.
[0081] TS processing circuit 52 is step S1 of drawing 9 . Or it sets and the inputted packet data would not be inputted through the bus, it judges whether it is a thing based on an input signal. When packet data are inputted through the bus, it is step S2. It sets and DIF (digital interface) input process is performed. That is, TS processing circuit 52 is transmitted to the receive buffer which does not decode and illustrate the packet data from a bus, and is returned to the stream of TS packet data on the basis of the transmitted time stump information. Thereby, the packet data inputted based on an input signal and the packet data of the same gestalt are obtained. When input packet data are a thing based on an input signal, it is step S2. It is step S3, without carrying out. Processing is shifted.
[0082] Next, TS processing circuit 52 is step S3. It sets, and PID chooses PAT transmission packet of 0 and extracts PAT. Step S4 PMT section of the program specified out of PAT is extracted. By referring to PMT section, PID of each stream which constitutes the program of the program number specified by the program number specification signal based on user operation is obtained. TS processing circuit 12 is the following step S5. The packet of each PID corresponding to the program set and specified is extracted.
[0083] Next, TS processing circuit 52 is step S6. It judges whether it sets and data are outputted to a bus. When outputting data to a bus, it is step S7. It sets and DIF output processing is performed. DIF output processing is processing which changes and outputs the extracted packet to the packet corresponding to P1394. For example, TS processing circuit 52 reads TS packet from the buffer for sending, after changing it into the bus bucket which added the time stump information, it encodes it, and it is outputted from a bus.
[0084] When not outputting to a bus, it is step S8 about processing. It shifts and data output processing to a picture and the speech-compression decryption circuits 6 and 7 is performed. That is, TS processing circuit 52 is step S8. The HDR of TS packet set and extracted is analyzed and **********-ization is performed. By the way, as mentioned above, the split transmission of the PES packet is carried out by two or more TS packets in TS system of MPEG 2 specification. PES packet adds header information to the data of coding units, such as a picture or voice, for example, in the case of picture data, one PES packet is constituted in many cases by the coded data for one frame.
[0085] Step S9 It judges whether the data of TS packet can restore PES packet completely then. When it can restore, in step S10, PES ********** processing of the HDR of PES packet is analyzed and carried out, and it outputs to a picture and the speech-compression decryption circuits 6 and 7 at step S11.
[0086] a ****** [ that specification of a program number was changed in the following step S12 ] -- or power -- it judges whether it became off When power does not become off and the program number is not changed, it is step S5 about processing. It returns and an extraction of a packet is repeated. Moreover, when a program number is changed, or when power becomes off, OFF of power is judged in the following step S13. When power is not off, it is step S3 about processing. It returns, PAT transmission packet is extracted and the packet based on a program number specification signal is extracted. A detection of power OFF ends a series of processing.
[0087] Thus, in the gestalt of this operation, while the same effect as the gestalt of operation of drawing 1 is acquired, it is enabled to perform each processing of the digital-input/output section by TS processing circuit.
[0088] By the way, in the gestalt of operation of drawing 8 , it is the configuration that only one program number specification signal is supplied to TS processing circuit 52, and TS processing circuit 52 performs only any of whether it processes in order to view and listen to the inputted packet data, or to perform processing for outputting to an external instrument, or one processing. On the other hand, it is possible to also make other programs output and record on an external instrument by enabling supply of two program number specification signals in TS processing circuit, reproducing the program for example, under broadcast.

[0089] Drawing 10 is a flow chart which shows the flow of TS processing circuit in this case of operation. In drawing 10 , the same sign is given to the same step as drawing 9 , and an explanation is omitted.
[0090] The 1st and 2nd program number specification signals are inputted into TS processing circuit. The 1st program number specification signal is for specifying the program number of the program to which it views and listens, and the 2nd program number specification signal is for specifying the program number of the program outputted to an external instrument.
[0091] In step S4 ', PMT section of the 1st program number specification signal is extracted based on extracted PAT transmission packet. Next, it judges whether the output to a bus is specified in step S6 '. When the output to a bus is not specified, it is step S5 about processing. It shifts and the packet corresponding to a program number is extracted. Next, step S6 " is minded and it is step S8. It shifts and output processing of the data to a picture and the speech-compression decryption circuits 6 and 7 is performed.
[0092] On the other hand, when the output to a bus is specified, processing is shifted to step S4 " from step S6 ', and PMT section of the 2nd program number specification signal is extracted. In this case, step S5 It sets and the packet corresponding to the 1st program number specification number and the 2nd program number specification signal is extracted, respectively. Next, processing is shifted to step S21 through step S6 ", and it judges whether it is the packet of the 2nd program. About the packet of the 2nd program, it is step S7. It sets, DIF output processing is performed and it is step S8 about the packet of the 1st program. Output processing for subsequent decryption processing is performed.
[0093] Subsequently, in step S22, it judges whether the 1st and 2nd program numbers were changed, or power became off. When power does not become off and the 1st and 2nd program numbers are not changed, it is step S5 about processing. It returns and an extraction of a packet is continued. When the 1st or 2nd program number is changed, or when power becomes off, processing is shifted to step S12' and it judges whether the 1st program number is changed or power is off. When power does not become off and the 1st program number is not changed, processing is returned to step S6 ' and the existence of the output specification to a bus is judged.
[0094] Thus, according to the flow of drawing 10 , it is possible to also make other programs output and record on an external instrument, viewing and listening to the predetermined program of the received broadcast signal.

---

[Translation done.]

* NOTICES *



---

Effect

---

[0095] [Effect of the Invention] As explained above, while prolonged record is enabled according to this invention, without degrading the quality of a digital broadcast signal, it has the effect that it can constitute cheaply.

---

[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

---

DESCRIPTION OF DRAWINGS

---

[Brief Description of the Drawings]
[Drawing 1] The block diagram showing the gestalt of 1 implementation of the digital broadcast accepting-station equipment concerning this invention.
[Drawing 2] Explanatory drawing for explaining TS packet.
[Drawing 3] The timing chart for explaining the significant part of coded data.
[Drawing 4] The block diagram showing the concrete configuration of the digital interface 13 in drawing 1 .
[Drawing 5] Explanatory drawing showing the transmission protocol procedure in a link layer.
[Drawing 6] Explanatory drawing for explaining an eye ********** transfer.
[Drawing 7] The block diagram showing the digital-input/output section included in the gestalt of other operations of this invention.
[Drawing 8] The block diagram showing the digital-input/output section included in the gestalt of other operations of this invention.
[Drawing 9] The flow chart for explaining an operation of the gestalt of operation of drawing 8 .
[Drawing 10] The flow chart which shows the modification of the gestalt of operation of drawing 8 .
[Drawing 11] The block diagram showing the conventional digital broadcast accepting-station equipment.

[Description of Notations]
6 [ -- The digital-input/output section, 11 / -- A record program selection circuitry, 12 / -- TS processing circuit, 13 / -- A digital interface, SW1 and SW2 / -- Switch ] -- A picture compression decryption circuit, 7 -- A speech-compression decryption circuit, 10

---

[Translation done.]